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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/696,232	10/26/2000	Mitsuru Ishikawa	07553.0017	5127

22852 7590 06/05/2003

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EXAMINER

OLSEN, ALLAN W

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/696,232

Applicant(s)

ISHIKAWA ET AL.

Examiner

Allan W. Olsen

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7-11 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7-11 and 13-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 March 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Drawings

The corrected or substitute drawings were received on March 18, 2003. These drawings are acceptable.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1-5, 7-11 and 13-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claims have been amended to recite "...said processing gas... does not contain O₂...". The examiner finds no explicit support for this negative limitation.

In addition, independent claims have been amended to recite "...said processing gas contains at least C_xF_y...". The examiner finds no support in the specification for the generic claiming of a fluorocarbon. The examiner notes that on page 15 of the specification, applicant states, "the present invention may be adopted successfully as long as the processing gas contains at least N₂ and C₄F₈ or at least N₂ and CF₄." Therefore the invention specifically requires that use of C₄F₈ and/or CF₄, rather than a generic fluorocarbon, C_xF_y.

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Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 7-11 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,168,726 issued to Li et al. (hereinafter, Li'726).

Li teaches etching a silicon containing, organic, low k dielectric layer that overlies a silicon nitride layer. Li teaches that N₂ should be added to a plasma gas mixture comprising C₄F₈ and Ar. See the "Etch-2" column of TABLE 10 in column 12 and column 12, line 66-column 13, line 6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li'726 in view of US Patent 6,284,149 issued to Li et al. (hereinafter, Li'149).

The teachings of Li'726, as noted above, are herein relied upon.

Li'726 does not teach an N₂ that is at least 10 times greater than the C₄F₈ flow rate.

Li'149 teaches when etching a silicon containing, organic, low k dielectric layer with a plasma comprising N₂ and C₄F₈ wherein the flow ratio of N₂ to C₄F₈ is 45:3.


Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 703-306-9075. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills, can be reached on 703-308-1633. The general fax numbers for TC1700 are 703-872-9310 (non-after finals) and 703-872-9311(after-final). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Allan Olsen, Ph.D.
May 23, 2003


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It would have been obvious to one skilled in the art, at the time the invention was made, to add an amount of N₂ to the C₄F₈/Ar etch of Li'726 that would result in the claimed ratio of at least 10:1 because, Li teaches that by providing a substantial amount of N₂ to the plasma, one can prevent retrograde etching and thereby produce nearly vertical sidewalls.

Claims 1-5, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,658,425 issued to Halman et al. (hereinafter, Halman) in view of US Patent 6,140,222 issued to Bollinger et al. (hereinafter, Bollinger).

Halman teaches using a plasma comprising CF₄, Ar and N₂ to etch a multi-layered oxide that comprises a planarizing layer of a spin-on-glass (SOG) that overlies a TEOS or BPSG silicon dioxide layer. See: abstract; col 4, lns 18-21, 35-41 and 50-53; and col 5, ln 8-12.

Halman does not teach etching a layer comprising an upper polysiloxane layer overlying a lower SiO₂ layer. Halman does not teach using a N₂:CF₄ ratio of between 1:1 and 4:1

Bollinger teaches applying a polysiloxane layer over a SiO₂ layer (column 2, lines 7-21).

It would have been obvious to one skilled in the art, at the time the invention was made, to apply polysiloxane over Halman's silicon dioxide layer because Halman teaches applying a planarizing layer over the layer of silicon dioxide and Bollinger teaches that polysiloxanes function in the planarizing capacity that is required by Halman. Furthermore, it would have been obvious to one skilled in the art to use a claimed amount of N₂ because Halman teaches that an unlimited amount of N₂ may be used.

Response to Arguments

Applicant's arguments have been considered but are moot in view of the new grounds of rejection.